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10/665,722	09/19/2003	Victor Morozov	NOVUS1170-1	4650

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EXAMINER	
JUNG, UNSU	

ART UNIT	PAPER NUMBER
1641	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/665,722	MOROZOV ET AL.	
	Examiner	Art Unit	
	UNSU JUNG	1641	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *26 March 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-20* is/are pending in the application.

4a) Of the above claim(s) *8, 9, and 14-20* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-7 and 10-13* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *19 September 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *7/19/04*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

1. Applicant's election with traverse of species A (analyte bound to a particle, claim 6) in the reply filed on March 26, 2008 is acknowledged. The traversal is on the ground(s) that search may be carried out without an undue burden on the examiner as the search can be directed towards the overall analyte binding as opposed to a specific bound composition. This is not found persuasive because the analyte bound to a particle and analyte forming a portion of a natural complex are two different structures, which require different search terms. Although the search would be directed towards the overall analyte binding, specific bound composition must also be searched. While searches would be expected to overlap, there is no reason to expect the searches to be coextensive.

The requirement is still deemed proper and is therefore made FINAL.

2. Claims 8, 9, and 14-20 have been previously withdrawn as a result of election of Group I (claims 1-13) and species as set forth in the reply filed on December 12, 2007.

3. Claims 1-20 are pending, claims 8, 9, and 14-20 have been withdrawn from consideration, and claims 1-7 and 10-13 are currently under consideration for patentability under 37 CFR 1.104.

Information Disclosure Statement

4. The information disclosure statement (IDS) submitted on July 19, 2004 has been considered by the examiner. In addition, the publication date of non-patent literature reference (AL, Yamagata et al.) has been corrected to "2001" as indicated on the signed and initialed copy of the IDS.

Claim Rejections - 35 USC § 112

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claims 1-7 and 10-13 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

A. In claim 1 and all dependent claims thereof, the phrase "immobilizing a probe on a surface in a channel, wherein the channel comprises an analyte solution or suspension" is vague and indefinite. The phrase indicates that the channel contains analyte solution or suspension during the probe immobilization step and the subsequent binding of the analytes to the probe would have occurred during the immobilization step and prior to the step of "applying force to the analyte to move the analyte toward the probe" as recited in claim 1 and all

dependent claims thereof since the immobilized probe is already in the proximity of the analyte to allowing binding of the analyte to the probe. Therefore, it is unclear whether or not the probe immobilizing step is carried out in the presence of the analyte solution or suspension in the channel. According to the specification (p4, paragraph [0022]), the immobilization step is performed before being placed in a channel, wherein the channel comprises an analyte solution or suspension. Therefore, claim 1 and all dependent claims thereof have been interpreted in light of the specification, which discloses that the immobilization step is performed before being placed in a channel, wherein the channel comprises an analyte solution or suspension.

B. In claim 7, the term "solution" in line 7 is vague and indefinite. It is unclear whether or not the term "solution" of line 7 is referring to "analyte solution" of claim 1. For the purpose of examination, the term "solution" in claim 7 has been interpreted as being equivalent to the "analyte solution" of claim 1.

C. Claim 13 recites the limitation "bead" in lines 1-2. There is insufficient antecedent basis for this limitation in the claim. It is unclear whether or not the term "bead" is referring to the term "particle" recited in claims 6 and 12. For the purpose of examination, the term "bead" in claim 13 has been interpreted as being equivalent to the "particle" of claims 6 and 12.

Claim Rejections - 35 USC § 102

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

8. Claims 1, 2, 10, and 11 are rejected under 35 U.S.C. 102(a) and 102(e) as being anticipated by Wagner et al. (U.S. Patent No. 6,329,209 B1, published Dec. 11, 2001 and filed July 14, 1999) (hereinafter "Wagner").

Wagner anticipates instant claims by teaching a method for detecting an analyte (see entire document) comprising:

- immobilizing a probe on a surface in a channel (channel is formed by an array substrate 3 and a cover 2 in Fig. 3), wherein the immobilized probe molecule is placed in a channel comprising an analyte solution or suspension (fluid sample, column 35, lines 25-51);

- applying force to the analyte to move the analyte toward the probe, thereby allowing the analyte to bind the probe (delivering the fluid sample to the array, column 35, lines 25-51);
- applying another force, to remove unbound or weakly bound analyte from the surface (washing said array with analyte free fluid to remove unbound analyte, column 35, lines 25-51); and
- detecting the analyte bound to the probe (column 33, line 49-column 34, line 9).

With respect to claim 2, Wagner teaches that the surface is an activated surface (functionalized surface/activated surface, column 7, line 57-column 8, line 46) and a method further comprising covalently binding the probe molecule to the surface (column 8, lines 9-12).

With respect to claims 10 and 11, Wagner teaches that the probe is one of a population of probe molecules deposited on the surface as a microarray, wherein the probe molecules are deposited as spot (reference number 15 in Fig. 1) having a specific form to be visually recognizable (column 15, lines 8-24).

9. Claims 1-4, 10, and 11 are rejected under 35 U.S.C. 102(b) as being anticipated by Heller et al. (U.S. Patent No. 6,245,508 B1, June 12, 2001) (hereinafter "Heller").

Heller anticipates instant claims by teaching a method for detecting an analyte (see entire document) comprising:

- immobilizing a probe on a surface in a channel (channel is formed by an biochip 60 and a flow cell 62 in Fig. 6 and column 10, lines 17-40), wherein the immobilized probe molecule is placed in a channel comprising an analyte solution or suspension (column 10, line 66-column 11, line 2);
- applying force to the analyte to move the analyte toward the probe, thereby allowing the analyte to bind the probe (column 10, line 66-column 11, line 21);
- reversing the force or applying another force, to remove unbound or weakly bound analyte from the surface (column 11, lines 22-41); and
- detecting the analyte bound to the probe (column 10, lines 17-20 and column 18, line 3).

With respect to claim 2, Heller teaches that the surface is an activated surface (functionalized surface, column 18, lines 7-17) and a method further comprising covalently binding the probe molecule to the surface (column 10, lines 36-40).

With respect to claim 3, Heller teaches that the surface is a semi-permeable membrane, penetrable for salt and buffer ions (small charged entities), but not for analytes (large charged entities, column 10, lines 5-9).

With respect to claim 4, Heller teaches a method, wherein the analyte is moved to and from the membrane electrophoretically (column 5, lines 33-37).

With respect to claims 10 and 11, Heller teaches that the probe is one of a population of probe molecules deposited on the surface as a microarray (column 5,

lines 22-32), wherein the probe molecules are deposited as spot (reference number 26A-26D in Fig. 2B), which has a specific form to be visually recognizable.

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

11. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

12. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to

consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

13. Claims 3 and 4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wagner et al. (U.S. Patent No. 6,329,209 B1, published Dec. 11, 2001 and filed July 14, 1999) (hereinafter "Wagner") in view of Heller et al. (U.S. Patent No. 6,245,508 B1, June 12, 2001) (hereinafter "Heller").

Wagner teaches a method for detecting an analyte as set forth above. Although, Wagner teaches that a variety of substrate materials of the surface including porous substrates (column 13, line 47-column 14, line 14), Wagner fails to specifically teach that the surface includes a semi-permeable membrane, penetrable for salt and buffer ions, but not for analytes.

With respect to claims 3 and 4, Heller teaches a method for detecting an analyte as set forth above. Further, Heller teaches a method of using an electrode array surface including a semi-permeable membrane, penetrable for salt and buffer ions (small charged entities), but not for analytes (large charged entities, column 10, lines 5-9) for moving analytes to and from the membrane electrophoretically (column 5, lines 33-37). The method allows unique feature allows relatively dilute charged analytes or reactant molecules free in solution to be rapidly transported, concentrated, and reacted in a serial or parallel manner at any specific micro-location that is maintained at the opposite charge to the analyte or reactant molecules (column 11, lines 1-22). This

ability to concentrate dilute analyte or reactant molecules at selected microlocations greatly accelerates the reaction rates at these microlocations (column 11, lines 1-22).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to employ the method of Heller, which employs a semi-permeable membrane on an electrode array surface as the substrate for immobilizing the probes of Wagner in order to rapidly transport, concentrate, and react in a serial or parallel manner at any specific micro-location that is maintained at the opposite charge to the analyte or reactant molecules. The advantage of greatly accelerating the reaction rates at these microlocations on the array surface provides the motivation to combine methods of Wagner and Heller with a reasonable expectation of success.

14. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wagner et al. (U.S. Patent No. 6,329,209 B1, published Dec. 11, 2001 and filed July 14, 1999) (hereinafter "Wagner") in view of Heller et al. (U.S. Patent No. 6,245,508 B1, June 12, 2001) (hereinafter "Heller") as applied to claims 3 and 4 above, and further in view of Bier (U.S. Patent No. 4,040,940, Aug. 9, 1977).

Wagner in view of Heller teaches a method for detecting an analyte as set forth above. Although Wagner in view of Heller teaches that the analyte solutions may be delivered to the reaction sites via electrophoretic flow in the channel, Wagner in view of Heller is silent on teaching an additional step of forming a self-forming density gradient in the channel in order to suppress convection in the channel.

Bier teaches that the electrophoretic process of separation of soluble or particulate ionized matter is potentially complicated by convective effects (see entire document, particularly column 1, lines 16-33). These may be caused by unequal temperature distribution, due to Joule heating or unequal solute concentration, due to resolution of the sample into sharply compartmentalized individual zones. Stabilization against these convective disturbances is essential. The most common way to avoid convection is to work in gels, or columns packed with finely dispersed matter, such as glass beads, agarose granules, starch granules, etc., whereby electrophoresis is carried out in the interstitial capillary bed formed by these materials. Another way to stabilize against convective flow is to create a density gradient using an inert solute, such as sucrose (self-forming density gradient).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide a density gradient using an inert solute, such as sucrose (self-forming density gradient) as taught by Bier in the channel of Wagner in view of Heller in order to stabilize against convective flow during the electrophoretic flow of the analyte solution within the channel. The advantage of avoiding the convective flow, which can potentially complicate the electrophoretic flow of particles/analytes in solution, provides the motivation to combine teachings of Wagner in view of Heller and Bier with a reasonable expectation of success.

15. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Heller et al. (U.S. Patent No. 6,245,508 B1, June 12, 2001) (hereinafter "Heller") in view of Bier (U.S. Patent No. 4,040,940, Aug. 9, 1977).

Heller teaches a method for detecting an analyte as set forth above. Although Heller teaches that the analyte solutions may be delivered to the reaction sites via electrophoretic flow in the channel, Heller is silent on teaching an additional step of forming a self-forming density gradient in the channel in order to suppress convection in the channel.

Bier teaches that the electrophoretic process of separation of soluble or particulate ionized matter as set forth above.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide a density gradient using an inert solute, such as sucrose (self-forming density gradient) as taught by Bier in the channel of Heller in order to stabilize against convective flow during the electrophoretic flow of the analyte solution within the channel. The advantage of avoiding the convective flow, which can potentially complicate the electrophoretic flow of particles/analytes in solution, provides the motivation to combine teachings of Heller and Bier with a reasonable expectation of success.

16. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wagner et al. (U.S. Patent No. 6,329,209 B1, published Dec. 11, 2001 and filed July 14, 1999) (hereinafter "Wagner") in view of Baselt (U.S. Patent No. 5,981,297, Nov. 9, 1999).

Wagner teaches a method for detecting an analyte as set forth above. Although Wagner teaches that variety of different detection methods can be employed using appropriate labeling/reporter groups that produce detectable signal (column 33, line 49-column 34, line 9), Wagner is silent on teaching the analyte bound to a particle.

Baselt teaches method and apparatus for detecting target molecules in a liquid phase (see entire document, particularly Abstract). The apparatus monitors whether the target molecule has selectively bound to recognition agents on the surface of a magnetic field sensor by monitoring the output of the sensor (Abstract). The recognition agents which selectively bind target molecules are covalently bound to microfabricated magnetic field sensors (Abstract). These sensors are then exposed to a sample suspected of containing the target molecules, whereupon the recognition agents bind to and immobilize any target molecules present (Abstract). A change in the output of the magnetic field sensors indicates the presence of magnetic particles bound to the sensors, and thereby indicates the presence and concentration of target molecule in the sample (Abstract). The method of Baselt allows simultaneous and rapid detection of a wide range of chemical and biological species obtained from either the vapor or liquid phase, with a high degree of sensitivity (column 3, lines 16-35). The detection device of Baselt is compact and fully automated and allows measurement of intermolecular binding forces and thereby analyze recognition events (column 3, lines 16-35).

Therefore, one of ordinary skill in the art at the time of the invention to employ the detection method of Baselt, in which analytes are bound to magnetic particles, in the method of Wagner as the detection method of Baselt allows simultaneous and rapid

detection of a wide range of chemical and biological species obtained from either the vapor or liquid phase, with a high degree of sensitivity. The advantage of allowing simultaneous and rapid detection of a wide range of chemical and biological species obtained from either the vapor or liquid phase, with a high degree of sensitivity using compact and fully automated device further allowing measurement of intermolecular binding forces and thereby analyze recognition events provides the motivation to combine methods of Wagner and Baselt. Further, one of ordinary skill in the art would have had a reasonable expectation of success in employing the detection method of Baselt, in which analytes are bound to magnetic particles, in the method of Wagner since Wagner teaches that variety of different detection methods known in the art can be employed using appropriate labeling/reporter groups that produce detectable signal.

17. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Heller et al. (U.S. Patent No. 6,245,508 B1, June 12, 2001) (hereinafter "Heller") in view of Baselt (U.S. Patent No. 5,981,297, Nov. 9, 1999).

Heller teaches a method for detecting an analyte as set forth above. Although Heller teaches that variety of different detection methods can be employed using appropriate labeling/reporter groups that produce detectable signal (column 19, line 47-column 20, line 6), Heller is silent on teaching the analyte bound to a particle.

Baselt teaches method and apparatus for detecting target molecules in a liquid phase using magnetic particles as set forth above.

Therefore, one of ordinary skill in the art at the time of the invention to employ the detection method of Baselt, in which analytes are bound to magnetic particles, in the method of Heller as the detection method of Baselt allows simultaneous and rapid detection of a wide range of chemical and biological species obtained from either the vapor or liquid phase, with a high degree of sensitivity. The advantage of allowing simultaneous and rapid detection of a wide range of chemical and biological species obtained from either the vapor or liquid phase, with a high degree of sensitivity using compact and fully automated device further allowing measurement of intermolecular binding forces and thereby analyze recognition events provides the motivation to combine methods of Heller and Baselt. Further, one of ordinary skill in the art would have had a reasonable expectation of success in employing the detection method of Baselt, in which analytes are bound to magnetic particles, in the method of Heller since Heller teaches that variety of different detection methods known in the art can be employed using appropriate labeling/reporter groups that produce detectable signal.

18. Claims 7, 12, and 13 rejected under 35 U.S.C. 103(a) as being unpatentable over Wagner et al. (U.S. Patent No. 6,329,209 B1, published Dec. 11, 2001 and filed July 14, 1999) (hereinafter "Wagner") in view of Baselt (U.S. Patent No. 5,981,297, Nov. 9, 1999) as applied to claim 6 above, and further in view of Smith et al. (U.S. PG Pub. No. US 2002/0001803 A1, published Jan. 3, 2002 and filed on July 20, 1999) (hereinafter "Smith").

Wagner in view of Baselt teaches a method for detecting an analyte as set forth above. Although Wagner in view of Baselt teaches magnetic particles comprising iron oxide, whose density would be greater than the density of a solution, Wagner in view of Baselt is silent on teaching use of centrifugal forces to move the particle to and from the membrane.

Smith teaches a method of applying centrifugal force to a chamber containing surface bound molecular probes in the interior of the chamber in order to bring sample fluid to the surface bound molecular probes and improve reaction by maximizing contact between the components of the sample fluid and the surface bound molecular probes (see entire document, particularly p3, paragraph [0027] and p4, paragraph [0050]).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to employ the method of Smith, which uses centrifugal force to the immobilized probe on the surface of the channel, in the method of Wagner in view of Baselt in order to bring analyte bound particles of Heller in view of Baselt to the surface bound probes and improve reaction by maximizing contact between the analyte bound particles and the surface bound probes with a reasonable expectation of success. The advantage of moving analyte bound particles to and from the membrane using centrifugal force, which is independent of analyte bound particles charge status, provides the motivation to combine teachings of Wagner in view of Baselt and Smith with a reasonable expectation of success.

With respect to claim 12, Wagner in view of Baselt and Smith teaches a method, wherein the particle is subjected to combined action of two forces (centrifugal and

applied flow through the channel), which would intrinsically make the particle roll or slide over the surface.

With respect to claim 13, Wagner in view of Baselt and Smith teaches a method, further comprising recognizing the bead/particle having analyte captured on its surface as set forth above. The method of Wagner in view of Baselt and Smith detects bead/particle having analyte captured on its surface once the analyte is bound to the probes immobilized on the surface after reaction and washing steps (recognizing and sorting a bead having analyte captured on its surface). Therefore, the bead/particle having analyte would be tethering on the array of probes as the bead/particle having analyte are immobilized on the array surface via interaction with the immobilized probes.

19. Claims 7, 12, and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Heller et al. (U.S. Patent No. 6,245,508 B1, June 12, 2001) (hereinafter "Heller") in view of Baselt (U.S. Patent No. 5,981,297, Nov. 9, 1999) as applied to claim 6 above, and further in view of Smith et al. (U.S. PG Pub. No. US 2002/0001803 A1, published Jan. 3, 2002 and filed on July 20, 1999) (hereinafter "Smith").

Heller in view of Baselt teaches a method for detecting an analyte as set forth above. Although Heller in view of Baselt teaches magnetic particles comprising iron oxide, whose density would be greater than the density of a solution, Heller in view of Baselt is silent on teaching use of centrifugal forces to move the particle to and from the membrane.

Smith teaches a method of applying centrifugal force to a chamber containing surface bound molecular probes in the interior of the chamber in order to bring sample fluid to the surface bound molecular probes as set forth above.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to employ the method of Smith, which uses centrifugal force to the immobilized probe on the surface of the channel, in the method of Heller in view of Baselt in order to bring analyte bound particles of Heller in view of Baselt to the surface bound probes and improve reaction by maximizing contact between the analyte bound particles and the surface bound probes with a reasonable expectation of success. The advantage of moving analyte bound particles to and from the membrane using centrifugal force, which is independent of analyte bound particles charge status, provides the motivation to combine teachings of Heller in view of Baselt and Smith with a reasonable expectation of success.

With respect to claim 12, Wagner in view of Baselt and Smith teaches a method, wherein the particle is subjected to combined action of two forces (centrifugal and applied flow through the flow channel), which would intrinsically make the particle roll or slide over the surface.

With respect to claim 13, Heller in view of Baselt and Smith teaches a method, further comprising recognizing the bead/particle having analyte captured on its surface as set forth above. The method of Heller in view of Baselt and Smith detects bead/particle having analyte captured on its surface once the analyte is bound to the probes immobilized on the surface after reaction and washing steps (recognizing and

sorting a bead having analyte captured on its surface). Therefore, the bead/particle having analyte would be tethering on the array of probes as the bead/particle having analyte are immobilized on the array surface via interaction with the immobilized probes.

Prior Art of Record

20. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

- Stimpson (U.S. 6,037,186, Mar. 14, 2000) teaches method of forming an antibody array on microporous membrane materials such as cellulose and nitrocellulose (see entire document, particularly column 3, lines 47-56).
- Talley et al. (U.S. 6,133,043, Oct 17, 2000) teaches magnetic particle based electrochemiluminescent detection (see entire document).
- Parce et al. (U.S. 6,267,858 B1, July 31, 2001) teaches a method of delivering fluids via electrophoretic flow (see entire document, particularly column 10).
- Gordon (U.S. 6,309,875 B1, Oct. 30, 2001) teaches a method of agitating a reaction cell using centrifugal force orthogonal to the surface of an array (see entire document, particularly Abstract).
- Wagner et al. (U.S. Patent No. 6,406,921 B1) teaches a method for detecting an analyte (see entire document) comprising: immobilizing a probe on a surface in a channel (channel is formed by an array substrate

3 and a cover 2 in Fig. 3), wherein the immobilized probe molecule is placed in a channel comprising an analyte solution or suspension (fluid sample, column 17, lines 62-column 18, line 3); applying force to the analyte to move the analyte toward the probe, thereby allowing the analyte to bind the probe (delivering the fluid sample to the array, column 17, lines 62-column 18, line 3); applying another force, to remove unbound or weakly bound analyte from the surface (washing said array with analyte free fluid to remove unbound analyte, column 17, line 62-column 18, line 3); and detecting the analyte bound to the probe (column 17, lines 62-column 18, line 3). Wagner further teaches that the surface is an activated surface (functionalized surface/activated surface, column 8, lines 10-53) and a method further comprising covalently binding the probe molecule to the surface (column 5, lines 36-45) and the probe is one of a population of probe molecules deposited on the surface as a microarray, wherein the probe molecules are deposited as spot (reference number 15 in Fig. 1) having a specific form to be visually recognizable (column 9, lines 37-54).

- Cheng et al. (U.S. PG Pub. No. US 2001/0045359 A1, Nov. 29, 2001) and Huang et al. (U.S. PG Pub. No. US 2003/0146100 A1, Aug. 7, 2003) teaches an electrode array with a flow chamber (see entire document, particularly paragraph [0097]).

- Jacobs et al. (U.S. PG Pub. No.'s US 2002/0095073 A1, July 18, 2002) teaches a method of mixing fluids in a direction orthogonal to the plane of an array via vacuum suction and electrophoresis.

Conclusion

21. No claim is allowed.

22. Any inquiry concerning this communication or earlier communications from the examiner should be directed to UNSU JUNG whose telephone number is (571)272-8506. The examiner can normally be reached on M-F: 9-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Long Le can be reached on 571-272-0823. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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